



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(ONLINE)
SEMESTER I
SESSION 2020/2021**

COURSE NAME : ALGEBRA
COURSE CODE : BIC 10303
PROGRAMME CODE : BIS / BIP / BIW / BIM
EXAMINATION DATE : JANUARY/FEBRUARY 2021
DURATION : 3 HOURS
INSTRUCTION : 1. ANSWER ALL QUESTIONS.
2. PLEASE MAKE SURE TO
CLICK "SAVE ANSWER" BUTTON
FOR SUBJECTIVE QUESTIONS.
OBJECTIVE QUESTIONS ARE
SAVED AUTOMATICALLY.

THIS QUESTION PAPERS CONSISTS OF FOUR (4) PAGES



Q1 (a) Translate the following sentences into inequalities.

16. (i) The sum of 5 and a number is equal and more than 8. (1 mark)
- (ii) The sum of a number and 9 more than the number is at least (1 mark)
- (iii) A number minus 6 is greater than 4. (1 mark)
- (iv) The sum of x and 7 less than x is not equal to 3. (1 mark)
- (v) A number plus 5 is not equal but less than 21. (1 mark)

(b) Solve the following inequalities.

- (i) $2x - 3 < 7 - 7x < 3x + 7$ (3 marks)
- (ii) $\frac{1}{x+4} - \frac{2}{x-3} \geq 0$ (6 marks)
- (iii) $5 \leq |4x + 3| < 12$ (7 marks)

(c) A rocket takes off vertically upward from a platform. Its height (h , in meters) after t seconds takeoff is modeled by the equation (if air resistance is neglected):

$$h(x) = -16t^2 + 128t .$$

Analyze:

- (i) how long will it take for the rocket to return to a platform? (4 marks)
- (ii) after how many seconds will the rocket be 156 feet above the platform? (5 marks)

Q2 (a) The first three terms of arithmetic sequence are h , 8 and k . Find the value of $h + k$.

(3 marks)

(b) A stall in Café UTHM selling 'Teh Tarik' gives choice to the consumers using either condensed milk or evaporate milk in their drinks. In a particular day the stall have 70 cans of condensed milk and 48 cans of evaporated milk. The stall used 5 can of condensed milk and 3 cans of evaporated milk in a day. Examine how many days the milk stock in the Café will last?

(6 marks)

- (c) Given the sum of the first n terms of a geometric series as $S_n = \frac{5}{2}(3^n - 1)$.
Find the following:
- first term of the series. (1 mark)
 - common ratio of the series. (2 marks)
- (d) Hayley Rose has just completed her diploma in Computing field. She was offered a job from two different companies. Berjaya Computer Sdn. Bhd. offer her an initial salary RM36,000 per annum with 5% increment from the basic salary while Global Computer Sdn. Bhd. offer her an initial salary RM30,000 per annum with 9% increment from the basic salary. The salary from both companies forms a geometric sequence with common ratio 1.05 and 1.09 respectively. Hayley Rose decided to save 20% of her salary for further study after working 10 years. Analyze which company will give Hayley Rose higher saving for her study? (8 marks)

- Q3** (a) Compute the following operations

$$\begin{pmatrix} 3 & -7 \\ 1 & 0 \\ 2 & -1 \end{pmatrix} \times \begin{pmatrix} -2 & 2 \\ 0 & 4 \end{pmatrix} + \begin{pmatrix} 4 & 0 & -2 \\ 6 & 2 & -1 \end{pmatrix}^T$$

(3 marks)

- (b) Given

$$Q = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 4 \\ 1 & 3 & 9 \end{bmatrix}$$

- Find the inverse of matrix Q by using the *elementary row operation*. (8 marks)
 - Proof your answer in part Q3(b)(i). (2 marks)
 - Determine the determinant of matrix Q and justify whether matrix Q is invertible or not? (7 marks)
- (c) Compute the eigenvalues and eigenvectors of the following matrix.

$$P = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$$

(10 marks)

- Q4** (a) Table Q4 shows the content of a menu for breakfast that was suggested by a nutritionist.

Table Q4: Menu for Breakfast

Item	Content of Breakfast (in mg)		
	Iron	Protein	Carbohydrate
Skim milk (per glass)	1	1	1
Lean red meat (quarter pound)	2	4	1
Whole-grain bread (two-slice)	3	9	1

A person on a special diet must have 14mg of iron, 36g of protein, and 6g of carbohydrates.

- (i) Write the **system of linear equations** representing this problem. (2 marks)
- (ii) Convert the system of linear equations above into the matrix form $AX = B$. (2 marks)
- (iii) By using the Cramer's rule method, analyze the number of glasses of skim milk, number of quarter-pound servings of meat and number of two-slice servings of whole-grain bread should the person take on his special diet. (10 marks)

- (b) Solve the following system by using Gauss elimination method.

$$x + 2y + 3z = 10$$

$$x + y = z$$

$$-1 - z = -y$$

(6 marks)

- END OF QUESTIONS -

TERBUKA